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Background: In the context of the current COVID-19 epidemic, industrial design is constrained by external environment and market factors, and the traditional bionic design process is difficult to achieve, nor can it meet the product image needs of users. The traditional bionic modelling feature extraction mostly depends on the designer's cultural background and design experience. However, most designers face difficulties in extracting design knowledge from biological information. The purpose is to explore the role of product image form design based on bio inspired design method in finding bio inspired prototypes that meet the needs and positioning of target product image, and summarize the application experience.

Subjects and Methods: The "Shape Structure Behavior Function" (SSBF) decomposition model for product image modeling and the "Function Image Shape Design Context" (FISD) description model for bio inspired prototype were established. Ten professionals in the field of industrial design participated in the eye tracking experiment of product image modeling feature recognition, and extracted the key modeling parts of the corn harvester for SSBF decomposition; Forty subjects participated in the biological morphological image cognition experiment, and used FISD description model to establish the corresponding relationship between the functional and structural attributes of biological inspiration prototype.

Results: The experiment of product image modeling feature recognition showed that different modeling features had different effects on the overall image of the product, and the header, cab and car body of the corn harvester were the most critical modeling parts; The biological morphology image cognition experiment shows that the mantis and beetles in the Insect class have the highest matching degree with the product image vocabulary, and the image modeling design of the corn harvester can select them as the prototype.

Conclusions: This paper proposes an imagery cognitive association method based on PIFD-BID, and proposes the key methods and technologies for the four stages of imagery acquisition, expression, matching and solution. The example verification of corn harvester shows that the adjectives decomposed by the eye-tracking experiment and SSBF are more targeted and representative; Through the FISD description model, the typical functions and structural features of the bio-inspired prototype in a specific situation are integrated into the bio-inspired image features to effectively avoid the interference of redundant information, and the directivity and pertinence are clearer. The product image coherent association method based on PIFD-BID can support the design activity to some extent. However, the method needs to be further developed to meet the design needs under current contexts.

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STUDY ON THE IMPACT OF INDUSTRIAL AGGLOMERATION AND DIFFUSION FACTORS ON MANUFACTURING INDUSTRY UNDER COVID-19 FROM PERSPECTIVE OF MANAGEMENT PSYCHOLOGY: BASED ON THE DATA OF CITIES IN THE PEARL RIVER DELTA

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Background: The COVID-19 pandemic has swept across the world, damaging the economies of all countries to different degrees, with economic growth slowed down and even under recession. China's vast territory, large population and frequent foreign exchanges make it more difficult to prevent and control COVID-19. The enterprise production and people's lives have been significantly disturbed. Manufacturing, as a pillar industry in China, cannot escape by luck.

Subjects and Methods: This paper studies the impact of manufacturing employees' psychology and emotions on enterprise productivity after the new crown epidemic from the perspective of management psychology, and collects data through questionnaire surveys and face-to-face interviews. Using Krugman specialization index, this paper analyzes specialization level of manufacturing industry in Pearl River Delta cities, thoroughly examines the spatial distribution changes of labor-intensive, capital-intensive, technology-intensive manufacturing industries in the Pearl River Delta cities to explore the key elements in manufacturing industry upgrading. Using panel data of the nine Pearl River Delta cities in 2010 - 2020 for regression analysis, the effects of agglomeration factors and diffusion factors on manufacturing growth is analyzed empirically.

Results: Affected by the epidemic, the proportion of output value of labor-intensive manufacturing in the Pearl River Delta has decreased significantly, the labor mobility in the industry is strong, the unemployment rate is high, the profit margin of low-end manufacturing enterprises is low, and the salary and welfare are poor, which makes employees unstable and work enthusiasm poor, which in turn affects product quality and production efficiency. There are obvious structural differences in the manufacturing subsectors between Guangzhou and Shenzhen, forming a good industrial division of labor. The cities on the west bank of the Pearl River Estuary (Zhuhai, Zhongshan and Jiangmen) have quite different manufacturing structures, with specialization index above 0.7. There is a strong correlation between the development of high-end manufacturing industry in each region and the investment of local R&D expenditure and

resources. The empirical analysis shows that, among the agglomeration factors, the regional transportation conditions, external factors, technological innovation ability and the degree of opening to the outside world all have significant effects on the growth of manufacturing industry.

Conclusions: Among the cities in the Pearl River Delta, Guangzhou and Shenzhen have the most developed manufacturing industries, and they are also the most seriously affected by the epidemic, and migrant workers have been affected by the epidemic to stop production and work, making their lives much more stressful than locals, lacking a sense of psychological security, and prone to the return of migrant workers. Manufacturing industry in Guangzhou is big and comprehensive, with both traditional manufacturing and emerging intelligent manufacturing taking a place. The manufacturing industry in Shenzhen is specialized and refined, which prefers high-end manufacturing, with modern information industry occupying a unique position. The empirical analysis shows that the agglomeration factor in the new economic geography theory has a major impact on manufacturing industry, while diffusion factor has a relatively weak influence.

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STRUCTURAL CHANGE OF MANUFACTURING INDUSTRY AND EVOLUTION OF DOMINANT INDUSTRIES IN GUANGDONG-HONG KONG-MACAO GREATER BAY AREA UNDER THE IMPACT OF COVID-19 BASED ON THE PERSPECTIVE OF SOCIAL PSYCHOLOGY

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Background: The outbreak of COVID-19 at the beginning of 2020 inflicts damages to numerous countries and regions, disturbing enterprise production, people's lives and all walks of life, with economic development hindered and growth rate slowed down. Manufacturing industry, as the pillar industry of the national economy, is also greatly affected. The Guangdong-Hong Kong-Macao Greater Bay Area, an important region for China's opening-up, is open, inclusive and economically active, but is also suffering from the scourge of COVID-19.

Subjects and Methods: This paper interviewed various types of enterprises and conducted interviews with employees at all levels to investigate that due to the impact of the new crown epidemic, employees generally have bad emotions such as worry, anxiety, and depression, and employee work efficiency has declined. By calculating the Krugman specialization index of cities in the Guangdong-Hong Kong-Macao Greater Bay Area, this paper analyzes the differences in industrial structure between cities in Hong Kong, Macao and the Pearl River Delta. Location quotient index is used to measure the evolution of the manufacturing industry with a comparative advantage in the Pearl River Delta, and analyze the development of high-end manufacturing industry.

Results: Affected by the epidemic, the global economy has slowed down, the mobility of manufacturing workers has declined, the unemployment rate has risen, large-scale layoffs and salary cuts in well-known enterprises have been common, and the sense of psychological crisis of employees has risen sharply. At the same time, with the continuous advancement of artificial intelligence and big data technology, low-end labor is constantly being replaced. The Krugman Specialization Index shows that the industrial structure is quite different between Hong Kong, Macao and Pearl River Delta cities, with a very low proportion of manufacturing and a major shift of labor to the service sector. By comparing the changes of location quotient values of each manufacturing industry in 2000, 2008, 2013 and 2020, it is found that only furniture manufacturing, printing and recording media reproduction industry in the traditional manufacturing industries in the Pearl River Delta still maintain the leading advantage in China, with the location quotient on the rise.

Conclusions: Due to human fear of the unknown, the new crown virus not only invades the human body, but also brings great pressure to the human psyche, especially the working class with low income levels and unstable salaries. Most of the traditional advantaged manufacturing industries in the Guangdong-Hong Kong-Macao Greater Bay Area are in a downward trend. Capital intensive manufacturing industries are developing steadily with little fluctuations, while the specialization level of high-tech industries such as equipment manufacturing, automobile manufacturing, computer and communication manufacturing is on the rise. There is a strong correlation between the development of high-end manufacturing industry in each region and the investment of local R&D expenditure and resources.

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